

Total
Large-current Measurements
Solution

Accessories for Power Meters and Digital Multimeters

751550/751552
751521/751523/751574



- Large-current measurements: Max. 400 Arms/1000 Arms/600 Apk
- Wide measurement frequency range: 20 Hz to 20 kHz/30 Hz to 5 kHz/DC to 100 kHz
 - High-precision measurements: 1.0%/0.3%/0.05%
- An ideal current sensor unit for highly accurate measurement of high capacity inverters such as EV, EHV, and FCU.
- Integrated as a sensor, the current transducer makes high-precision measurement possible (for battery evaluation and other applications).
 - Clamp-on probe enables hot line measurement.

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Large-current Sensor Units and Transducers Capable of Highly Accurate Measurement Starting in DC Range

Current sensor unit accessories for digital power meters and power analyzers

DC to 100 kHz/600 A peak Guaranteed calibration with powermeters



751521 (for single-phase measurements)



751523 (for three-phase measurements)



Current sensor units can be used for large-current power measurements, which are difficult to take directly in excess of a power meters rating. With the ability to measure a wide range of frequencies from DC to 100 kHz with high precision, these can be used in a variety of power measurement applications, such as EV/inverter drive motors and fuel cells. In addition, they can be calibrated when used in combination with Yokogawa's WT Series of digital power meters or PZ4000 power analyzer. This makes them well-suited to power measurement applications requiring an especially high level of precision. (However, only a limited number of points can be calibrated.)

Use model 751521 for single-phase measurements and model 751523 for three-phase measurements.

Features

- Wide dynamic range:
-600 A to 0 A to +600 A (DC)/600 A peak (AC)
- Wide measurement frequency range:
DC to 100 kHz (-3 dB)
- High-precision fundamental accuracy:
 $\pm(0.05\% \text{ of rdg}^* + 40 \mu\text{A})$
- Superior noise withstanding ability and CMRR characteristic due to optimized casing design
- Calibration enabled in combination with WT Series or PZ4000

*751521/751523 do not conform to CE Marking.

* "rdg" stands for reading.

Current transducer accessory for digital power meters and power analyzers

DC to 100 kHz/600 A peak

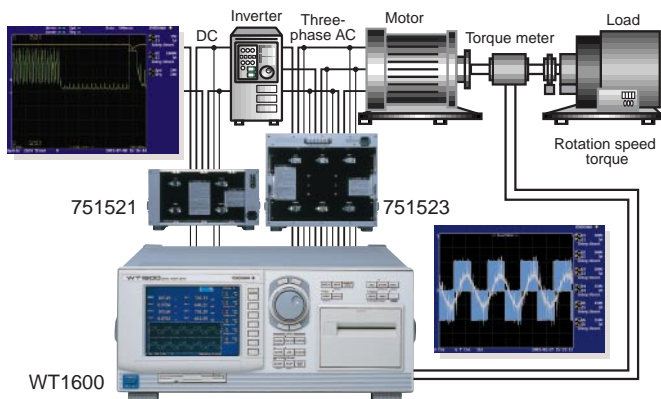
Yokogawa's current transducer model 751574 is a large-current measurement DC-CT used inside current sensor units 751521 and 751523. It is especially valuable for applications with limited installation space, such as measurements in embedded systems, and measurements in actual vehicles (e.g., EV/HEV). (Note: A separate drive DC power supply is required. In addition, precision guarantee conditions may differ from those of the current sensors, depending on conditions such as the conductor position of the input primary wiring.)

Features

- Wide dynamic range:
-600 A to 0 A to +600 A (DC)/600 A peak (AC)
- Wide measurement frequency range: DC to 100 kHz (-3 dB)
- High-precision fundamental accuracy:
 $\pm(0.05\% \text{ of rdg} + 40 \mu\text{A})$

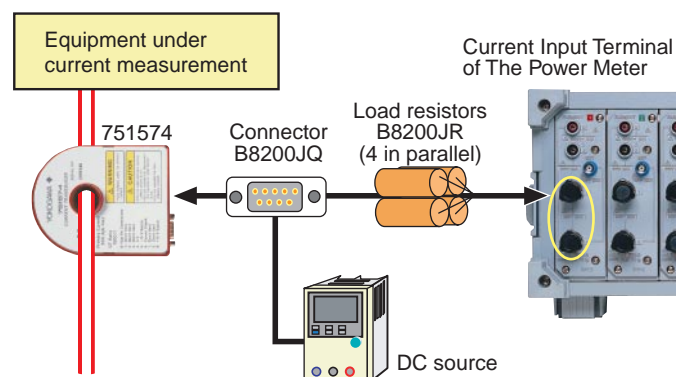


751574



Example of overall characteristics evaluation for inverter driven motor

751574 Connecting Diagram



Special AC-Input Clamp-on Probes for Large-current Hot Line Measurement

Current clamp-on probe accessories for digital power meters, power analyzers, and digital multimeters

AC 400 Arms (600 A peak) / AC 1000 Arms (1400 A peak)

Yokogawa's current clamp-on probes can be used for current power measurements on large-current equipment in excess of a power meter's rated range. The clamp-on design makes it possible to take measurements in tight spots, and to take measurements with live wires in already-installed equipment. Two models are available: 96001, which covers a wide frequency range; and 751552, which can be used for high-precision measurements. Model 96001 provides voltage output, so it can be used with waveform measuring instruments and digital

multimeters in addition to power meters. Model 751552 provides current output, so it can be combined with general power meters or digital multimeters that have a current input terminal. Model 751552 enables calibration when combined with the WT Series of digital power meters or PZ4000 power analyzer, so it is especially well-suited to power measurement applications requiring high precision. However, only a limited number of points can be calibrated.)



96001

* 96001 is a Yokogawa M&C product.
751550 is a model code only for Japan.



751552

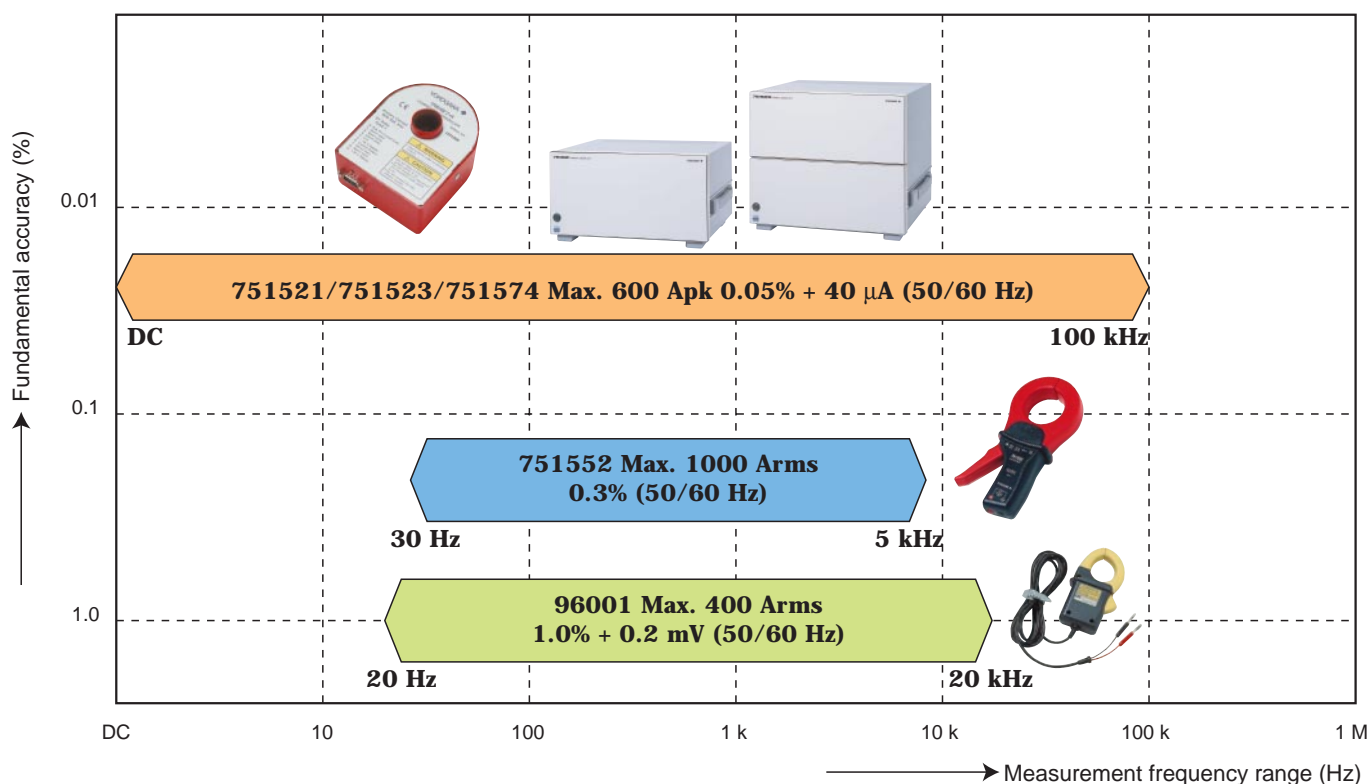
Features

- Wide dynamic range: 0 Arms to 400 Arms (AC); Max. 600 Apk (AC)
- Wide measurement frequency range: 20 Hz to 20 kHz ($\pm 5\%$)
- Fundamental accuracy: $\pm 1.0\%$ of rdg ± 0.2 mV
- Voltage output model: 10 mV/A
- Since this model is a voltage output type, you can use it for an oscilloscope.

Features

- Wide dynamic range: 0.001 Arms to 1000 Arms (AC); Max. 1400 Apk (AC)
- Wide measurement frequency range: 30 Hz to 5 kHz ($\pm 2\%$)
- High-precision fundamental accuracy: $\pm 0.3\%$ of rdg
- Phase error: 0.7 deg (50/60 Hz)
- Current output model: 1 mA/A

Comparison of Current Sensor Performance (measurement range vs. fundamental accuracy)



Specifications for Current Sensor Units and Transducer

751521/751523

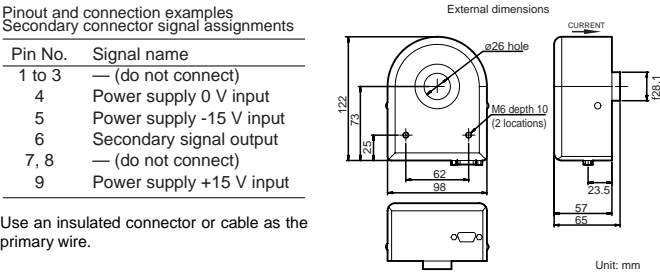
Specifications	
Input type	Floating input using CT(s)
Rated currents	DC: -600 A to 0 A to +600 A AC: 600 A peak 400 mA (with primary rated current of 600 A)
Output current	400 mA (with primary rated current of 600 A)
Input/output ratio	1500:1
Amplitude accuracy (within three months of calibration)	$\pm(0.05\% \text{ of rdg} + 40 \mu\text{A})$ DC $\pm(0.1\% \text{ of rdg} + 40 \mu\text{A})$ (30 Hz $\leq f < 45$ Hz) $\pm(0.05\% \text{ of rdg} + 40 \mu\text{A})$ (45 Hz $\leq f \leq 66$ Hz) $\pm(0.1\% \text{ of rdg} + 40 \mu\text{A})$ (66 Hz $< f \leq 1$ kHz) $\pm((0.05\% + 0.08 \times f\%) \text{ of rdg} + 40 \mu\text{A})$ (1 kHz $< f \leq 40$ kHz) $\pm((0.2\% \times f\%) \text{ of rdg} + 40 \mu\text{A})$ (40 kHz $< f \leq 100$ kHz) Accuracy values at frequencies over 1 kHz are provided as reference values. (Unit of f: kHz)
Reference conditions	23 \pm 5°C, 30-70% RH, AC input as sinewave Primary current: 2-600 A In-phase voltage: 0 V Supply voltage: 95-105 V AC, 110-120 V AC, or 225-240 V AC Add (reading error $\times 0.5$) to the above accuracy values.
Accuracy 12 months after calibration	
Temperature coefficient	0.01%/°C (10-18°C, 28-40°C)
Frequency range	DC to 100 kHz (-3 dB)
Continuous maximum allowable input	600 A peak For 400 Hz and higher, see the diagram titled 'Derating of primary current based on frequency' on next page.
Instantaneous maximum allowable input	3000 A peak for 0.1 second or less (reference value)
Continuous maximum in-phase voltage	600 V rms
Insulating resistance	Across individual input terminals and case, across individual input terminals and power plug, across individual input terminals and individual output terminals, across case and power plug, across individual output terminals and power plug, correlations of individual input terminals, correlations of individual output terminals: 50 M Ω or higher at 500 V DC
Withstand voltage	Across individual input terminals and case, across individual input terminals and individual output terminals, correlations of individual input terminals, across individual input terminals and power plug: 2200 V AC for one minute at 50/60 Hz Across case and plug, across individual output terminals and power plug: 1500 V AC for one minute at 50/60 Hz
Input terminal type	M12 nuts and bolts
Output terminal type	Screw terminal
Output load resistance	0.5 Ω or higher, 90 Ω or less See the diagram titled 'Derating of input current based on load resistance' on next page.
Warmup time	Approximately 30 minutes
Operating temperature and humidity ranges	10-40°C, 20-80% RH (no condensation)
Storage temperature range	0-60°C (no condensation)
Maximum usage elevation	2000 meters
Rated supply voltage and allowable range of supply voltage fluctuation	100 V AC/90-110 V, 115 V AC/105-125 V AC, or 230 V AC/220-250 V
Rated supply frequency and allowable range of supply frequency fluctuation	50/60 Hz/48-63 Hz
External dimensions	751521: Approximately 426 \times 221 \times 429.5 mm (WHD) 751523: Approximately 426 \times 354.8 \times 429.5 mm (WHD) Note: The dimensions shown exclude projections such as input terminals and base feet.
Weight	751521: Approximately 14 kg 751523: Approximately 24 kg
Consumed power	751521: Approximately 25 VA 751523: Approximately 75 VA

Model	Suffix code	Description
751521		Single-phase
751523	-10	Three-phase U, V
	-20	Three-phase U, W
	-30	Three-phase U, V, W
Supply voltage	-1	100 V AC (50/60 Hz)
	-3	115 V AC (50/60 Hz)
	-7	230 V AC (50/60 Hz)
Power cord	-D	UL/CSA standard
	-F	VDE standard
	-R	SAA standard
	-J	BS standard

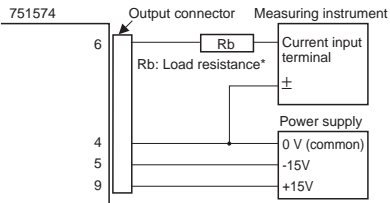
* 751523-10 is designed for PZ4000 and WT1600. 751523-20 is designed for the WT2000, and WT200 Series.
* 751521/751523 do not conform to CE Marking.

751574

Specifications	
Input type	Floating input using CT
Rated currents	DC: -600 A to 0 A to +600 A AC: 600 A peak 400 mA (with primary rated current of 600 A)
Output current	400 mA (with primary rated current of 600 A)
Current transformation ratio	1500:1
Current direction	Direction of arrow on unit
Amplitude accuracy (within three months of calibration)	$\pm(0.05\% \text{ of rdg} + 40 \mu\text{A})$ DC $\pm(0.05\% \text{ of rdg} + 40 \mu\text{A})$ 50/60 Hz
Reference conditions	23 \pm 5°C, 30-70% RH, AC input as sinewave Primary current: 2-600 A In-phase voltage: 0 V Supply voltage: DC $\pm(15 \text{ V} \pm 0.75 \text{ V})$ Conductor: Use a straight conductor ($\phi 25$ mm, 300 mm or longer), positioned at the center of the primary current hole. Add (reading error $\times 0.5$) to the above accuracy values.
Accuracy 12 months after calibration	
Conductor position effect	Add $\pm 0.05\%$ of rdg
Temperature coefficient	0.01%/°C (10-18°C, 28-50°C)
Measurement range	DC to 100 kHz (-3 dB)
Continuous maximum allowable input	600 A peak For 400 Hz and higher, see the diagram titled 'Derating of primary current based on frequency' on next page.
Instantaneous maximum allowable input	3000 A peak for 0.1 second or less (reference value)
Secondary load resistance	2.5 Ω or higher, 92.5 Ω or less See the diagram titled 'Derating of input current based on load resistance' below.
Operating temperature and humidity ranges	10-50°C, 20-80% RH (no condensation)
Storage temperature range	0-60°C (no condensation)
External dimensions	Approximately 122 \times 98 \times 57 mm (WHD) Note: The dimensions shown exclude connectors, conductor guides, and projections.
Primary current hole diameter	$\phi 26$ mm
Weight	Approximately 1 kg
Secondary conductor	D-SUB 9-pin
Supply voltage	$\pm 15 \text{ V} \pm 5\%$
Consumed power	Approximately 5 VA (when secondary output current is zero)
Consumed current	Approximately (330 mA + output current)
Emissions	Standard EN61326.
Immunity	Standard EN61326.



Use an insulated connector or cable as the primary wire.



Model number

Model	Description
751574	Current transducer

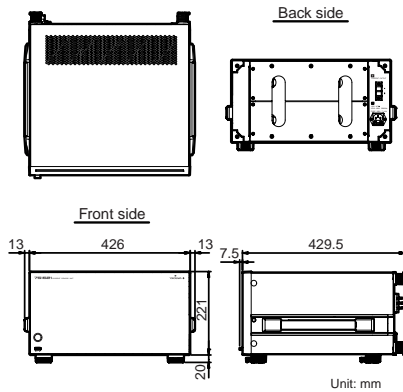
Calibration of the current transducer (751574) are not the same when combined with the WT Series or PZ4000. Also note that measurement errors may occur due to connections, such as the effect of the conductor position.

Accessories (sold separately)

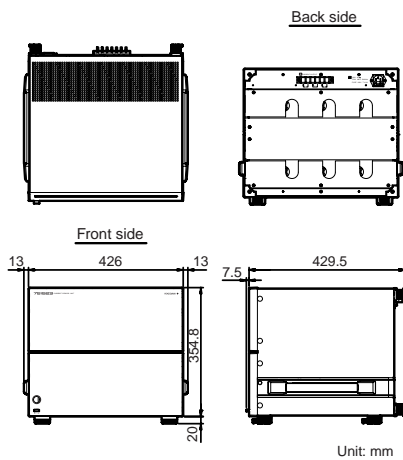
Product	Part no.	Specifications	Order quantity
Output connector	B8200JQ	D-SUB 9-pin, with 2 screws	1
Load resistors	B8200JR	10 Ω , 0.25 W Connect 4 in parallel to set resistance to 2.5 Ω .	4

External dimensions

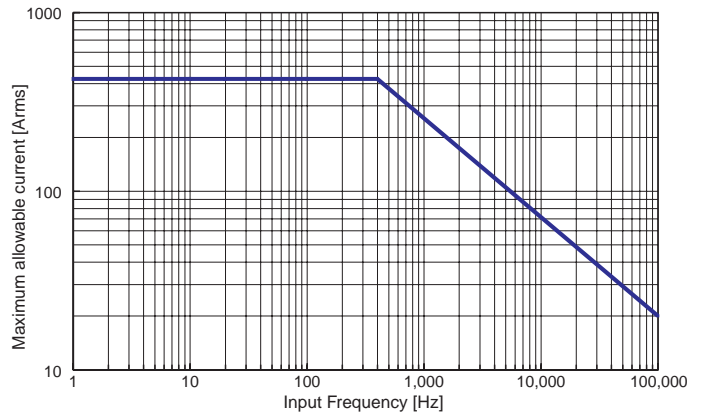
751521



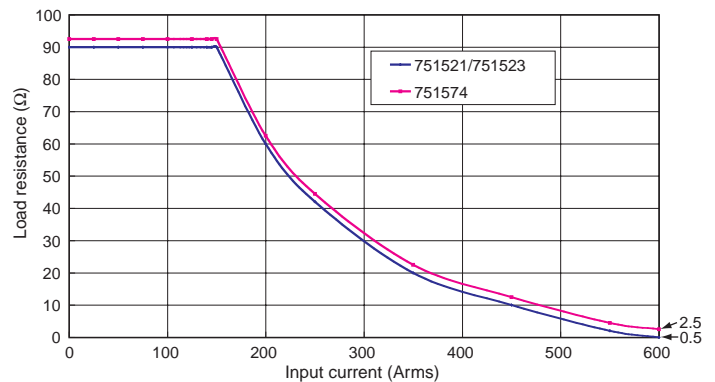
751523



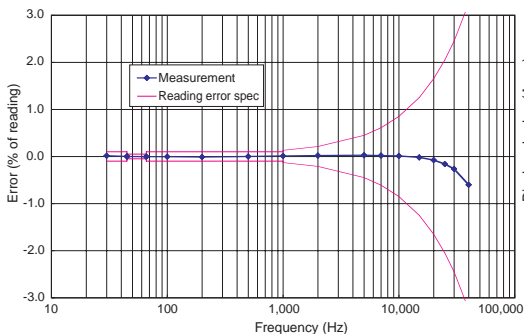
Derating of primary current based on frequency



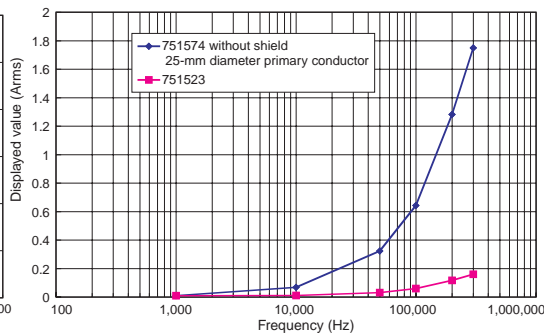
Derating of input current based on load resistance



Example of 751523 Frequency characteristic



Example of Comparison of CMRR characteristics of 751574 and 751523



Depending on usage conditions, the performance characteristics of the Current Transducer (model 751574) in terms of noise immunity and other factors may change. The Current Sensor Unit (model 751521/751523) provides superior noise immunity regardless of usage conditions. Note: Superior noise immunity assumes only mild effects from CMRR.

Frequently asked questions about combining accessories with WT Series digital power meters and PZ4000 power analyzer

Q: What is the range rating when combined with a power meter?

A: The rated output of the current sensor units and current transducer is 400 mA (current output). We recommend connecting the current input directly to the current input terminal, in light of noise and precision considerations.

The primary converted current range values for current input on the power meters are shown below. The input ranges below are calculated ranges and do not guarantee that measurement of current up to the maximum range is possible. The maximum allowable input for each combination is 600 A peak.

WT1600 5 A module: 15/30/75/150/300/750/1500/3000/7500 A

PZ4000 5 A module: 150/300/600/1500/3000/6000/15000 A

(The minimum range, if unmodified to 1/10 range, is 150 A.)

PZ4000 5 A module 1/10-current model (S2): 15/30/60/150/300/600/1500 A

WT2000 1/10-current model (S2): 150/300/750/1500/3000/4500 A

Note: See page 7, "Special Models for Current Transducer - Probe."

Q: What is the error when combined with a power meter?

A: Add the power meter error to the current sensor unit error or current transducer error. (Please refer to page P.7.)

There are special power meter models adjusted in combination with a current sensor unit. It is also possible to have your existing power meter calibrated in combination with a sensor unit. Ask us for further details. In both of these cases, the product is treated as a special-order product.

Q: What are the important things to remember about wiring?

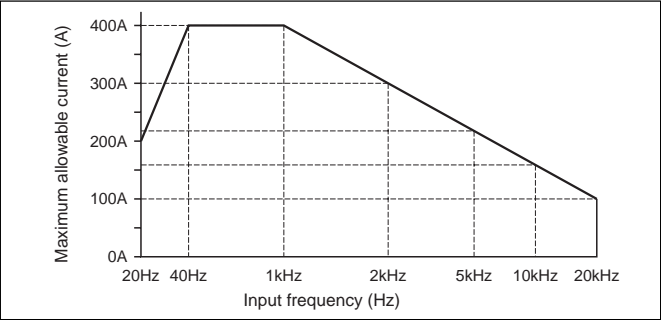
A: Make sure the primary wiring and secondary wiring do not interfere with each other. The secondary wiring may be affected by the primary wiring because it uses a very small current. Make the secondary wiring as short as possible and maintain its distance from the primary wiring, without allowing them to be parallel to each other.

We recommend AWG24 or higher as the secondary wiring material. Twisted-pair may be better than shielded cable for measurement applications such as inverters.

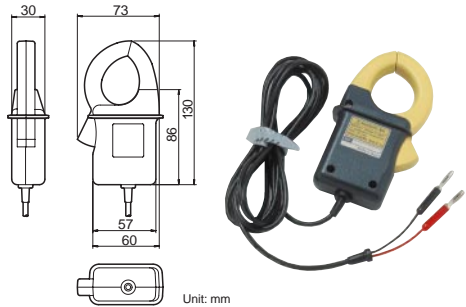
Current Clamp-on Probe Specifications

96001

Specifications	
Rated current	AC: 0-400 A (600 A peak)
Output voltage	10 mV/A (4 V AC max.)
Accuracy	Amplitude $\pm 1.5\%$ rdg ± 0.4 mV ($20\text{ Hz} \leq f < 40\text{ Hz}$) $\pm 1.0\%$ rdg ± 0.2 mV ($40\text{ Hz} \leq f \leq 1\text{ kHz}$) $\pm (0.8 + 0.2 \times f\text{ kHz})\%$ rdg $\pm (0.2 + 0.04 \times f\text{ kHz})$ mV ($1\text{ kHz} < f \leq 20\text{ kHz}$) Phase $\pm 3^\circ$ or less ($40\text{ Hz} \leq f \leq 1\text{ kHz}$) (Conditions: $23 \pm 5^\circ\text{C}$, 80% RH or less, sine wave input)
Maximum allowable current	See graph below.
Temperature coefficient	0.05% of fs/ $^\circ\text{C}$ (in ranges of $0-18^\circ\text{C}$ and $28-50^\circ\text{C}$)
Output impedance	Approximately $30\ \Omega$
Load impedance	100 k Ω or greater // 100 pF or less
External magnetic field effects	2 mV or less at 400 A/m
Working voltage	Maximum AC 600 Vrms
Measurable conductor diameter	Maximum $\phi 33$ mm
Operating temperature and humidity ranges	$0-50^\circ\text{C}$, 80% RH or less (no condensation)
Storage temperature range	$-20-60^\circ\text{C}$ (no condensation)
Withstand voltage	Across core metal area and case, across core metal area and lead plugs (ganged): 3700 V for one minute, at 50/60 Hz in each of the above locations
External dimensions	Approximately $73 \times 130 \times 30$ mm (WHD)
Weight	Approximately 220 g
Output cable length	Approximately 2.5 meters
Voltage output terminal connector	Banana terminal



External dimensions



96001 is a Yokogawa M&C product.
751550 is a model code only for Japan.

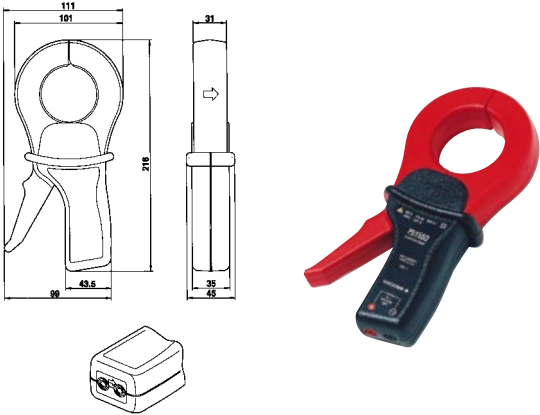
Important

This clamp probe is not compatible with PZ 4000 Standard sensor input. Requires Optional High Impedance Sensor Input.
When these clamp-on probes are connected to digital power meters WT210 and WT230, the WT unit must have an external input option (/EX1 or /EX2). We recommend selecting the particular option according to the measured current value, as shown below.

- If current is 0.5-25 A:
/EX2 option, 500/100/200 mV ranges
As scaling values, set the following respectively: 5.01/10.02/20.03 (A).
- If current is 25-400 A:
/EX1 option, 2.5/5/10 V ranges
As scaling values, set the following respectively: 250/500/1000 (A).
If the input current is in the range of 22-25 A (110-125% of rating at external input 200 mV range), the accuracy of the WT unit is calculated by adding its reading error $\times 0.5$ to the measurement accuracy.

751552

Specifications	
Rated current	AC 0.001-1200 Arms (1400 A peak) When inputting 1000 Arms - 1200 Arms (1 kHz), a 20 minute rest is required after 40 minutes of electrical continuity.
Output current	1000 mA (with 1000 A primary current)
Current transformation ratio	1000:1
Current direction	Direction of arrow on unit
Amplitude accuracy	Input current (I) accuracy with respect to output current $1\text{ mA} \leq I < 100\text{ mA}$: $\pm 3\%$ of rdg + $5\ \mu\text{A}$, phase error: no spec $100\text{ mA} \leq I < 1\text{ A}$: $\pm 2\%$ of rdg + $3\ \mu\text{A}$, phase error: no spec $1\text{ A} \leq I < 10\text{ A}$: $\pm 1\%$ of rdg, phase error: 2 deg $10\text{ A} \leq I < 100\text{ A}$: $\pm 0.5\%$ of rdg, phase error: 1 deg $100\text{ A} \leq I \leq 1200\text{ A}$: $\pm 0.3\%$ of rdg, phase error: 0.7 deg
Reference conditions	$23 \pm 3^\circ\text{C}$, 20-75% RH, 48-65 Hz sine wave input Input current: 0.001-1200 A, common mode voltage: 0 V Conductor: Clamp center Primary input: No DC current component, no AC magnetic field, external magnetic field below 40 A/m, secondary load resistance $1\ \Omega$ or less, no effects from current flowing through adjacent external conductors
Measurement range	$30\text{ Hz} \leq f \leq 5\text{ kHz}$ $30\text{ Hz} \leq f < 48\text{ Hz}$: Under $\pm 0.5\%$ of output signal $65\text{ Hz} < f \leq 1\text{ kHz}$: Under $\pm 1\%$ of output signal $1\text{ kHz} < f \leq 5\text{ kHz}$: Under $\pm 2\%$ of output signal
Conductor position effect	Add $\pm 0.1\%$ of rdg (400 Hz or less)
DC current effect	1% of output current at superimposition of 15 Adc
Temperature effect	0.02%/ $^\circ\text{C}$ or less of the output signal
Maximum output voltage:	30 V peak or less
Continuous maximum allowable input	For a continuous frequency f of 1 kHz or less $I \leq 1000\text{ A}$ For an input signal of $1000\text{ A} < I \leq 1200\text{ A}$ at 1 kHz, the probe can be used continuously for a maximum of 40 minutes. Do not perform measurement 20 minutes thereafter.
Working voltage	Maximum 600 Vrms
Secondary load resistance	$1\ \Omega$ or less
Secondary load resistance effect	1-5 Ω : 0.1% of rdg, add 0.2° phase error
Operating temperature and humidity ranges	$-10-50^\circ\text{C}$, 0-90% RH (no condensation)
Storage temperature range	$-40-70^\circ\text{C}$ (no condensation)
External dimensions	$111 \times 216 \times 45$ mm (WHD)
Measurable conductor diameter	Maximum $\phi 52$ mm
Output current connector	Plug-in terminal (safety terminal)
Weight	Approximately 620 g
Emissions	Standard EN61326 Class B.
Immunity	Standard EN61326 Annex A (for industrial environments).
Safety standards	Standard EN61010-1. Standard EN61010-2-032. 600 V overvoltage category III pollution level 2 300 V overvoltage category IV pollution level 2



Model number

Model	Description
751552	Clamp-on probe

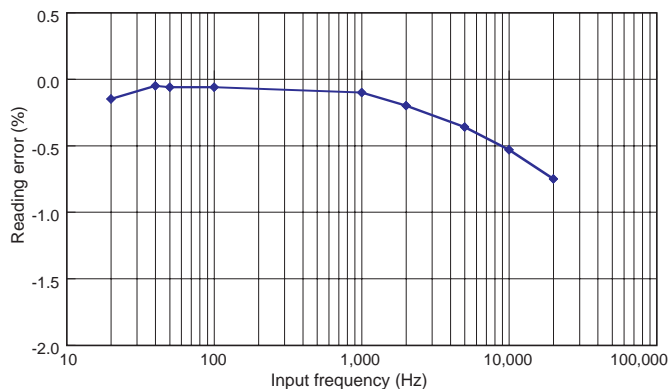
Accessories (sold separately)

Product	Part no.	Order quantity	Remarks
Measurement leads	758917	1	2 leads per set, used in combination with separately sold adapter. Length: 0.75 meter. Rated current: 32 Arms
Fork terminal adapter setting	758921	1	2 per set. Rated current for measurement leads

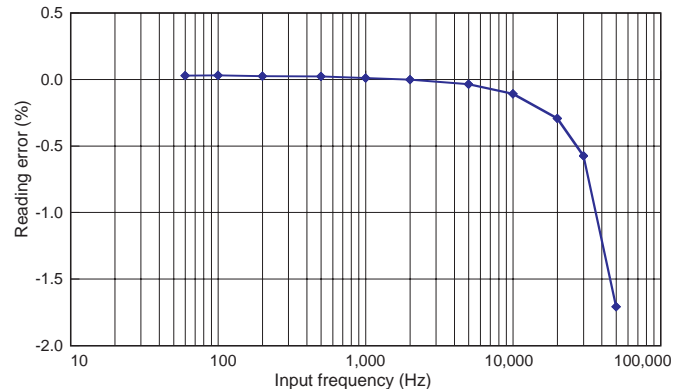
Example Characteristics of Clamp-on Probe

Example Characteristics

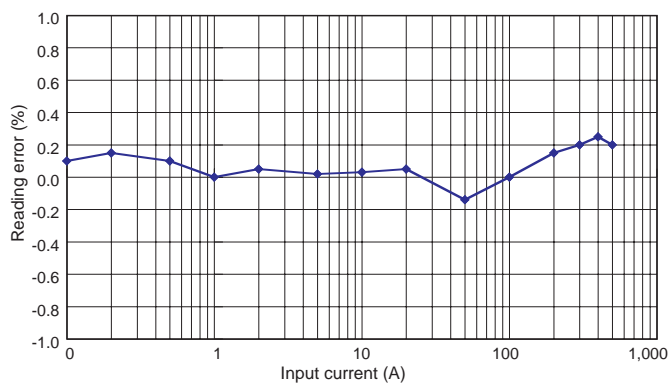
96001 Frequency Characteristic



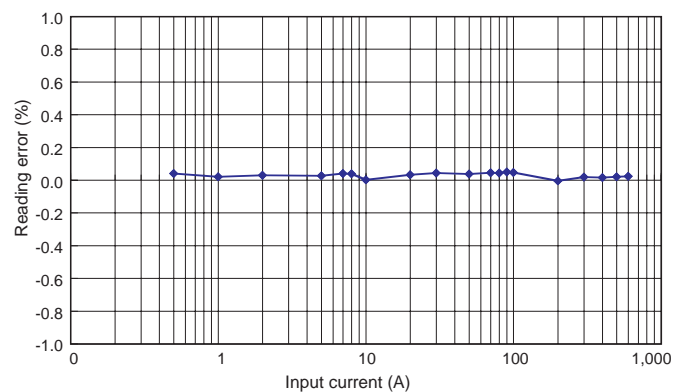
751552 Frequency Characteristic



96001 Input/Output Characteristic

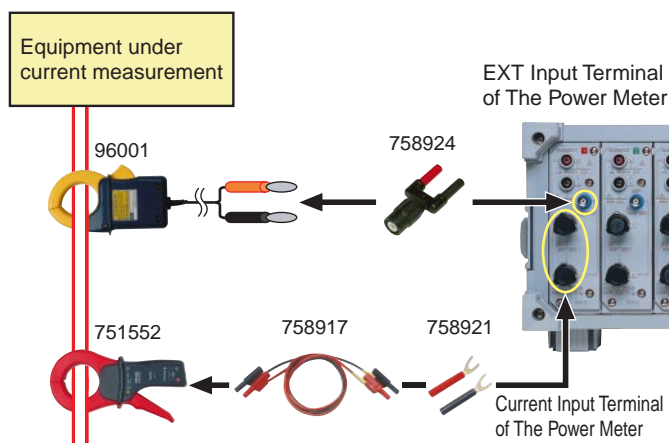


751552 Input/Output Characteristic



Connecting Diagram

Connecting Diagram for Clamp-on Probe



Don't connect and use the current input terminal and EXT terminal simultaneously.

Special Models for Current Transducer or Probe

WT2000

S2: 1/10 standard current range model

Description: 1-30 A range is changed to 0.1-3 A range.

Application example: Very small power measurements (e.g., during standby)

S12: 1/5 standard external shunt input range model

Description: 50-250 mV range is changed to 2.5-10 V.

Application example: Voltage output-type current sensor for large-current measurements (e.g., for EV development)

S21: Current sensor unit combined calibration model

Description: Three-wire, three-element model with 751521 (single-phase) on input side and 751523 (three-phase) on output side

Application example: High-precision power measurement system for large-current input during EV/HEV development

PZ4000

S2: 1/10 standard current range model

Description: 0.1-10 A range is changed to 0.01-1 A range.

Application examples: Very small power measurements (e.g., during standby), current output-type sensor for large current measurements (e.g., for EV development)

Related Products

758917

Measurement leads

Two leads in a set. Use 758917 in combination with 758922 or 758929. Total length: 75 cm. Rating: 1000 V, 32 A.



758922

Small alligator adapters

For connection to measurement leads (758917). Two in a set. Rating: 300 V.



758929

Large alligator adapters

For connection to measurement leads (758917). Two in a set. Rating: 1000 V.



758923

Safety terminal adapter set

(spring-hold type) Two adapters in a set.



758931

Safety terminal adapter set

Screw-fastened adapters. Two adapters in a set. 1.5 mm Allen wrench included for tightening.



758921

Fork terminal adapter

Two adapters (red and black) to a set. Used when attaching banana plug to binding post.



366921

1,2

Conversion adapter

For conversion between BNC and female banana plug.



758924

Conversion adapter

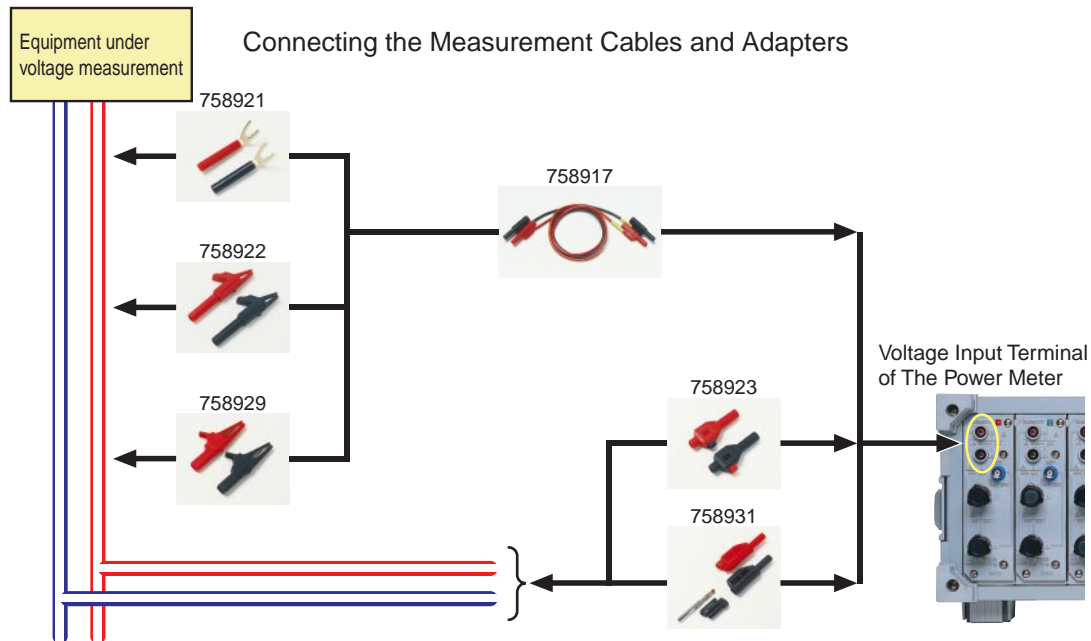
For conversion between BNC and female banana plug.



Due to the nature of this product, it is possible to touch its metal parts. Therefore, there is a risk of electric shock, so the product must be used with caution.

1: These accessories do not conform to CE Marking.

2: Use these products with low-voltage circuits (42 V or less).



NOTICE

- Before operating the product, read the instruction manual thoroughly for proper and safe operation.
- If this product is for use with a system requiring safeguards that directly involve personnel safety, please contact the Yokogawa sales offices.

YOKOGAWA

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